IN THE CLAIMS:

This complete listing of the claims replaces all prior listings of claims in the application.

1. (previously presented) A bone replacement material with orthophosphate, wherein

a) according to ^{31}P-NMR measurements, said bone replacement material comprises Q_0-groups of orthophosphate and Q_1-groups of diphosphate, the orthophosphates or Q_0-groups making up 65 to 99.9% by weight relative to the total phosphorus content of the finished material and the diphosphates or Q_1-groups making up 0.1 to 35% by weight relative to the total phosphorus content of the finished material, and

b) according to X-ray diffractometric measurements and relative to the total weight of the finished material, 35 to 99.9% by weight of a main crystal phase consisting of $Ca_{10}Na(PO_4)_7$, $Ca_{10}K(PO_4)_7$, mixtures thereof or mixed crystals according to the general formula $Ca_{10}K_xNa_{1-x}(PO_4)_7$, where x = 0 to 1, is contained in the bone replacement material and 0.1 to 25% by weight of a substance selected from the group consisting of $Na_2CaP_2O_7$, $K_2CaP_2O_7$, $Ca_2P_2O_7$ and mixtures thereof is contained as a secondary crystal phase, and

c) the X-ray amorphous phases contained besides the main crystal phase jointly make up 0.1 to 65% by weight relative to the total weight of the finished material.

2. (previously presented) A bone replacement material with orthophosphate, wherein

a) according to ^{31}P-NMR measurements, the bone replacement material comprises Q_0-groups of orthophosphate and Q_1-groups of diphosphate, the orthophosphates or Q_0-groups making up 65 to 99.9% by weight relative to the total phosphorus content of the finished material and the diphosphates or Q_1-groups making up 0.1 to 35% by weight relative to the total phosphorus content of the finished material, and

b) according to X-ray diffractometric measurements and relative to the total weight of the finished material, 35 to 99.9% by weight of a main crystal phase consisting of $Ca_{10}Na(PO_4)_7$, $Ca_{10}K(PO_4)_7$, mixtures thereof or mixed crystals according to the general formula $Ca_{10}K_xNa_{1-x}(PO_4)_7$, where x = 0 to 1, is contained in the bone replacement material and 0.1 to 25% by weight of a substance selected from the group consisting of $Na_2CaP_2O_7$, $K_2CaP_2O_7$, $Ca_2P_2O_7$ and mixtures thereof is contained as a secondary crystal phase, and

c) the X-ray amorphous phases contained besides the main crystal phase jointly make up 0.1 to 65% by weight relative to the total weight of the finished material,

obtainable by

mixing raw materials containing (in % by weight) 25-50 CaO, 1-20 Na_2O, 0.5-20 K_2O, 0-13 MgO and 0-10 SiO_2 and treating the aforesaid mixture with H_3PO_4 in an amount corresponding to 30-55 P_2O_5, SiO_2 or MgO or a mixture thereof making up at least 1% by weight, homogenizing and drying the mixture and subjecting it to a step-by-step thermal treatment lasting 1-2h at 350-450°C, 750-850°C and 950-1,050°C respectively, melting the mixture at between 1,550 and 1,650°C, holding it at the melting temperature for between 10 and 60 minutes and finally cooling the mixture in a spontaneous or temperature-controlled manner, grinding it, if necessary, and sintering it to obtain moulded bodies.

3. (original) A bone replacement material according to Claim 1, wherein in addition one or more chain phosphates from the group consisting of $NaPO_3$, KPO_3 and mixed crystals thereof are contained, which chain phosphates are detectable as Q_2-groups according to ^{31}P-NMR measurements, or the orthophosphate ß-tricalcium phosphate, which can be detected as Q_0-groups according to ^{31}P-NMR measurements, or mixtures thereof are contained.

4. (original) A bone replacement material according to Claim 2, wherein the chain phosphates make up 0.5 to 10% by weight.

5. (original) A bone replacement material according to Claim 1, wherein the secondary crystal phase contains a silicate phase corresponding to the SiO_2 content.

6. (original) A bone replacement material according to Claim 1, wherein the crystalline, amorphous or both phases contain magnesium in an amount ranging up to 10% by weight, calculated as MgO and relative to the weight of the finished material.

7. (original) A bone replacement material according to Claim 1, wherein the orthophosphates makes up 40 to 95% by weight.

8. (original) A bone replacement material according to Claim 7, wherein the ortho-phosphates makes up 50 to 90% by weight.

9. (original) A bone replacement material according to Claim 1, wherein the di-phosphate phase makes up 1 to 22% by weight.

10. (original) A bone replacement material according to Claim 9, wherein the di-phosphate phase makes up 5 to 8% by weight.

11. (original) A bone replacement material according to Claim 1, wherein the secondary crystal phase makes up 0.1 to 25% by weight.

12. (original) A bone replacement material according to Claim 11, wherein the secondary crystal phase makes up 1 to 25% by weight.

13. (previously presented) A bone replacement material according to Claim 1, wherein the total solubility ranges between 60 and 250µg/mg relative to the starting material if the test is carried out in 0.2M TRIS-HCl buffer solution at pH = 7.4, T = 37°C using a grain size fraction of 315-400µm, the duration of the test being 120h and the ratio of weighed-in sample to buffer solution being 50mg to 40ml.

14. (previously presented) A bone replacement material according to Claim 1, wherein the coefficient of expansion ranges between 10 and 17 x 10^{-6} K^{-1}, measured using a dilatometer.

15. (previously presented) A bone replacement material according to Claim 1, wherein the pH value of the surface changes by at least 0.3 units, towards the neutral point within the alkaline range if the material is stored in deionized water at room temperature for 72 hours or heated up to 60°C for 1 hour at a pressure of 1-3 bars and rinsed with deoinized water.

16. (original) A bone replacement material according to Claim 1, wherein said material is provided in combination with a metallic implant surface.

17. (original) A bone replacement material according to Claim 1, wherein in the processed, finished state said material consists of (in % by weight):
35 to 55 P_2O_5; 30 to 50 CaO; 1 to 12 Na_2O; 0.5 to 15 K_2O; 0 to 5 MgO; 0 to 5 SiO_2; SiO_2 or MgO or a mixture thereof making up at least 1% by weight.

18. (original) A bone replacement material according to Claim 17, wherein in the processed, finished state said material consists of (in % by weight):
35 to 55 P_2O_5; 30 to 50 CaO; 1 to 12 Na_2O; 0.5 to 15 K_2O; 0.1-5 MgO; 0 to 5 SiO_2; SiO_2 or MgO or a mixture thereof making up at least 1% by weight.

19. (original) A bone replacement material according to Claim 17, wherein said material consists of (in % by weight) 44 to 54 P_2O_5, 34 to 48 CaO, 1.5 to 10.5 Na_2O, 1 to 11 K_2O, 1.5 to 3 MgO, 0.1 to 4 SiO_2.

20. (original) A bone replacement material according to Claim 1, wherein said material is provided in the form of granulated materials, ceramic bodies or ceramic sheets.

21.-25 (cancelled)